Work on this whole apparatus and its products is being pursued by Mr. C. C. Speidel and the writer to determine its structure and function, which is supposed to have some relation to the electric apparatus of the skates, even if it does not prove to be the motor nerve cells of this apparatus.

ULRIC DAHLGREN

THE EFFECT OF STORAGE IN RIVER WATER (STERILIZED) ON THE PRODUCTION OF ACID IN CARBOHYDRATE SOLUTIONS BY THE BACILLUS COLI GROUP

DURING the last decade, the fermentation of the various carbohydrates with the production of acid and gas has been used almost exclusively for dividing the *Bacillus coli* group into many subdivisions. Theobald Smith (1893) seems to have been the pioneer in this field by his division of the colon group by the use of saccharose. Of the later workers, Winslow and Walker (1907) and MacConkey (1905) seem to have done the most careful work. MacConkey divided the *Bacillus coli* group into four subgroups by the use of dulcite and saccharose according to the following scheme:

	Saccharose	Dulcite
B. coli communis ..	—	+
B. coli communior ..	+	+
B. coli aerogenes ...	+	—
B. coli acidi lactici.	—	—

In 1909 MacConkey further subdivided the groups by the addition of motility and liquefaction of gelatine to his tests. Jackson (1911) in America subdivided MacConkey's original scheme by the use of mannite, raffinose, nitrate reduction, indol production, motility and other similar reactions. The fermentation of carbohydrates certainly offers a fruitful field for the classification of the *Bacillus coli* group, but we must soon decide just what the limits of fermentation must be, for the list of carbohydrates now in use is a long one and increasing steadily. The question will soon come to the front, "Are these fermentations of the various carbohydrates permanent functions of the organisms?" Horrocks (1903) found that members of the *Bacillus coli* group which were kept in sterilized sewage and Thames River water as well as in well water showed only a weak production of indol and a delayed action on milk. Peckham (1897) also found that the production of indol is variable. The purpose of the present work was to determine the permanency of acid production in carbohydrate solutions by the *Bacillus coli* group in stored river water. Three organisms of the original MacConkey scheme were used, namely, *B. coli communis, acidi lactici, aerogenes.*

Procedure

Water was taken from the Hudson River near the outlets of a sewer and 100 c.c. was poured into 30 bottles of 250 c.c. capacity. The water was sterilized and the sterilization tested by plating out respective samples. Pure agar cultures of *B. coli communis, aerogenes, acidi lactici* were emulsified in sterilized water. One cubic centimeter of this emulsion was placed in each bottle thus giving ten bottles of *communis, acidi lactici* and *aerogenes.* These bottles were stored away in a dark closet at 20° C. At various intervals inoculations were made into the carbohydrate solutions and titrations made at the end of the twenty-fourth hour or as near as possible to that period. During the course of the experiment the following carbohydrates were used: Dextrose, lactose, raffinose, saccharose, salicin, maltose and mannite.

The carbohydrates and other media used during the work were made according to standard methods of water analysis, report of 1905. Liebig's Meat Extract (3 grams to the liter) was used in place of meat and gave entirely satisfactory results. The method used in titrating the cultures followed standard methods in detail. Five cubic centimeters of the carbohydrate solution to be tested and 45 cubic centimeters of distilled water were placed in a casserole and boiled briskly for 1 minute. One cubic centimeter of phenolphthalein was added as indicator, and titration was made into the hot solution with N/20 NaOH. All results are expressed in per cent. normal. All cultures were incubated at 37° C. and titrated at the twenty-fourth hour. Controls were run

in all cases. The author wishes to thank Meyer M. Harris for the routine analyses.

TABLE I

Averages of the Production of Acid by Bacillus coli communis

Length of Storage in Weeks	Dextrose	Lactose	Maltose	Saccharose	Mannite	Raffinose	Salicin
0	2.71[1]	2.02	2.15	No acid produced	2.87	No acid produced	1.83
1	2.73	2.12	2.01		2.88		1.73
2	2.71	2.09	2.01		2.82		1.69
3	2.79	1.77	2.00		2.36		1.54
4	2.78	1.81	2.03		2.34		1.52
6	2.76	1.78	2.11		2.35		1.54
8	2.44	1.88	1.81		2.34		1.49
10	2.39	1.84	1.78		2.17		1.38
14	2.41	1.98	1.77		2.09		1.39

TABLE II

Averages of the Production of Acid by Bacillus coli aerogenes

Length of Storage in Weeks	Dextrose	Lactose	Maltose	Saccharose	Mannite	Raffinose	Salicin
0	2.76[2]	1.95	1.97	2.08	2.63	2.03	No acid produced
1	2.80	2.22	2.09	2.64	2.62	1.48	
2	2.77	2 09	2.16	2.66	2.49	1.53	
3	2.81	2.05	2.03	2.17	2.34	1.68	
4	2.75	1.86	1.96	1.90	2.30	1.61	
6	2.78	1.75	2.03	1.94	2.29	1.58	
8	2.47	1.76	2.03	1.95	2.32	1.60	
10	2.34	1.77	1.79	1.82	2.16	1.59	
14	2.27	1.80	1.81	1.77	2.13	1.58	

TABLE III

Averages of the Production of Acid by Bacillus coli acidi lactici

Length of Storage in Weeks	Dextrose	Lactose	Maltose	Saccharose	Mannite	Raffinose	Salicin
0	lost	1.96	2.46	No acid produced	2.82	No acid produced	1.65
1	2.80[3]	2.00	2.14		2.62		1.19
2	2.81	2.00	2.15		2.69		1.46
3	2.76	1.81	2.24		2.39		1.44
4	2.74	1.83	2.20		2.29		1.39
6	2.76	1.91	2.29		2.32		1.38
8	2.22	1.83	2.15		2.27		1.42
10	2.06	1.85	1.89		2.23		1.33
14	2.05	1.82	1.86		2.16		1.34

[1] Each result is the average of ten titrations.
[2] Each result is an average of ten titrations.
[3] Each result is an average of ten titrations.

Conclusion

From the tables of averages it may be seen that storage for a period of 14 weeks in sterilized Hudson River water (in tidal area) has very little effect upon the amount of acid produced in dextrose, lactose, saccharose, maltose, mannite, salicin and raffinose by various members of the *Bacillus coli* group, *i. e., Bacillus coli communis, aerogenes* and *acidi lactici,* which indicates that production of acid is a permanent characteristic of the *Bacillus coli* group. The slight decline of acid production may be due to diminished vitality of the organisms as a result of long storage in the water.

Wm. W. Browne
The College of the City of New York

THE WASHINGTON MEETINGS OF THE ASSOCIATION OF AMERICAN AGRICULTURAL COLLEGES AND EXPERIMENT STATIONS AND RELATED ORGANIZATIONS

The twenty-eighth annual convention of the Association of American Agricultural Colleges and Experiment Stations, held at Washington, D. C., November 11–13, 1914, and accompanied as usual by meetings of about half a score of related organizations, brought together college presidents, experiment station and extension directors, and workers in many fields of agricultural science to the number of approximately five hundred. The sessions of the various bodies were well attended and enthusiastic, and the programs included much of interest to educators, scientific men and the general public.

The complete list of organizations included in these meetings was as follows: American Association of Farmers' Institute Workers, November 9–11; American Farm Management Association, November 9, 10; American Society of Agronomy, November 9, 10; National Association of State Universities, November 9, 10; American Association for the Advancement of Agricultural Teaching, November 10; Society for the Promotion of Agricultural Science, November 10; American Society of Animal Production, November 10,